in use for over twenty years that were never painted. They were light, strong and very durable.

Since reading the letter referred to I have put a string around a venerable tree of the *Sassafras officinale* growing near and found its girth two feet from the ground to be 130 inches, or a diameter of 43 inches—certainly a quite dignified tree. This stands in the open field and is as broad and spreading as an oak in the same circumstances. It is very picturesque and greatly admired by all lovers of fine trees. I have known it for fifty years, and men that were old when I first knew it told me that it was just as large ever since they knew it as boys, so it would seem that the memory of man runs not back when it was not a respectable tree.

I am a great admirer of the sassafras as an ornamental tree and think the example of the English, who are quick to see beauty in our forest trees, may well be copied in planting this tree. There is only one drawback ; it is apt to sucker from the roots, although the one above referred to never does.

On the North Necks of this island are many large trees of the kind, but none I know quite so large in trunk, though much taller. N. HALLOCK.

Queens, L. I., Jan. 21, 1894.

A Brilliant Meteor.

LET me, in the hope of securing other accounts of the same phenomenon, report a remarkably fine meteor just seen by me.

As I, with a large number of other persons, was leaving the train at Newtonville at twelve minutes past six o'clock this evening a very brilliant meteor was seen to fall in the western sky.

We were looking directly west. The sky was absolutely cloudless, and the full moon was perhaps an hour high and, of course, at our backs. The meteor very much resembled a rocket or perhaps more strictly a large fire ball from a Roman candle. It came down the sky at an angle of about 45 degrees and from a point in the northwest perhaps 40 degrees above the horizon, where it first attracted our attention. It gave off many sparks and fiery streaks, which, however, remained visible in the bright moonlight but an instant. Its color was variously reported as white, blue and bluish-white. It seemed to me to be yellowish-white. It disappeared behind some buildings or a group of trees and still at full brilliancy and perhaps from 5 to 10 degrees from the horizon. From the hour at which the fall occurred and the remarkable and crystalline clearness of the sky, I am hopeful that it was observed and will be reported by many others, and that the falling body may have reached the earth before it was entirely consumed.

I have given the best judgments I can of distances in terms of degrees, but am aware that these may not be very accurate. My own impression was that the meteor was visible 5 or 6 seconds, but my nearest companion thought the time was fully 10 seconds.

The apparent rate of movement was that of a rocket after its culmination but before it has fallen very far, *i.e.*, the motion was slow as compared with that of many "shooting stars." C. H. AMES.

Newtonville, Mass., Jan. 19, 1894.

The Erilepidinæ.

IN my recently published "Families and Subfamilies of Fishes" (p. 135) appears the family *Anoplopomidæ* with the subfamilies *Erilepidinæ* and *Anoplopominæ*. In answer to a question, what is the former (and which may be repeated), I would state that *Erilepidinæ* is a subfamily for *Erilepis*, and that the generic name is simply a substitute for *Myriolepis* of Lockington. Lockington's name was given in 1880, but Egerton, in 1864, gave the same name to a Triassic genus of palæoniscoid fishes, and consequently another has to be supplied for Lockington's genus.

The *Anoplopomidæ* are closely related to the *Hexagrammidae* but appear to me to be sufficiently distinct. *Erilepis* (=*Myriolepis* Lock.) is most nearly related to *Anoplopoma*, and both undoubtedly belong to the same family. *Erilepis* is not closely related to *Agrammus*, with which it has been associated.

Myriolepis (Egerton) has been well differentiated by A. S. Woodward in the second volume of his "Catalogue of the Fossil Fishes" (pp. 430–515).

THEO. GILL.

Washington, D. C.

Fungi and Insects.

IN a late number of *Science* (No. 556, pp. 218, 219) Professor McCarthy discusses, under the head of "Fungi versus Insects," methods which have recently been largely used for the prevention of insect and fungous depredations. He seems to decry especially the use of fungicides, believing that they lead to more slovenly methods of cultivation and a neglect of hygienic plant conditions. The modern tendency is to prevent diseases rather than to await their coming and then cure them ; and Professor McCarthy seems to be arguing against one of the most potent agents which science has called to the aid of the agriculturist. There is no one to defend the practice of some grape-growers of using copper preparations so freely as to "plaster" the fruit with chemicals. The fault lies not with the remedy but with the method of applying it. If the directions given in every bulletin on fungicides be followed, there is no reason for having the fruit coated or even spattered with copper. Neither does it seem any argument in favor of abandoning the use of fungicides because they still cause a loss of $300,000,000 a year ! The question of course is, how much greater would the loss have been if fungicides had not been used at all. It has been shown in a recent bulletin of the Department of Agriculture[1] that over $30,000 was saved by only 250 growers in treating diseases of the grape alone. Other experiments have shown that many other diseases, such as apple scab, potato blight or rot, strawberry blight, etc., can be entirely prevented by the proper use of copper or other preparations. Furthermore, the argument advanced that, because the labor of one man or of two men can be vitiated by the lack of attention of a third, no good has resulted, is certainly fallacious.

It is difficult to see how "pathogenic, contagious disease-producing fungi or bacteria" can remedy matters very much as far as fungous diseases are concerned. It is scarcely probable that methods which are applicable for the destruction of insect enemies to plants, such as micro-organisms, can be used with success to destroy the fungi that may attack the same plants. While "an automatic antipest destroying agent" would be a good thing, supposing such a thing to exist, would the slovenly farmer become any less slovenly through its use ? Or would the careful farmer be any less or any more careful ? The investigations of Professor Forbes in Illinois and Professor Snow in Kansas have been instrumental in decreasing the ravages of the chinch bug and saving large sums of money to the farmer. These experiments have not, however, proceeded far enough to enable us to congratulate ourselves that we will be able to supply the necessary ammunition to destroy all noxious insects. Let us hope it will be

[1] Bull. No. 3, Div. of Veg. Path., p. 69.

so. But meanwhile there is no good reason for condemning the use of insecticides and fungicides because they have not proved to be the universal panacea for all the farmers' ills.

I believe it may be asserted without fear of successful contradiction that fungicides, and especially Bordeaux mixture, properly made and properly used, will repay many times over the cost of manufacture and application. When in addition to this we have good farming there is every reason for confidently expecting results which without their aid it would have been impossible to secure.

JOSEPH F. JAMES.

Washington, D. C., Dec. 22, 1893.

Expressions of Emotion in Birds' Song.

FROM the note of Mr. B. S. Bowdish I see that *Science* has taken up the question of expression of emotions in the "song" of birds. First of all, I hope to be allowed to refer to Severin Petersen's excellent book, "Vore Langfugle" (Our Singing Birds), published by Gad in Copenhagen, Denmark.

Then, I wish to immortalize the name of Hans, a canary bird, and a comfort to our home for about eight years. I have watched this bird, and know more about him than anybody else.

1. When I entered my rooms, and called him by name, he would say his "pip" with a sweet, whistling sound; he plainly was glad, and whenever I repeated his name his kind "pip" would sound through even three walls. 2. When he happened to see his enemies, the sparrows, or another male bird, Hans used to start a loud, shrill "song," laying his wings close to his body, while the feathers on his throat were standing almost straight out from the skin. This shrill song was different from 3, the song that came from him (*a*) when he was singing to the female or (*b*) when he sang just because he was glad. 4. If anybody scared our bird, a "pip" was heard from him, but different from that mentioned under 1. It was now uttered subdued, *sotto voee*, and with the bill *closed*; it sounded like "mi-i." This was especially the case when the bird saw a hat; there was nothing in the world of which the bird was more afraid than a hat or an umbrella. Though I am tempted, I shall venture no generalizations. When he became excited, he would sing even while eating, and so he would when he saw me. A *Dracaena* now shades his grave. Here is a question which should be taken up, like that of expression of emotion in man. Abundance of facts is noted (see the various volumes of Humboldt) and may be collected from many sources. It is a fascinating biological question which ought to be worked up *experimentally* also. I agree with Mr. Bowdish that there are many observers of birds who could not fail to see expressions of emotion in birds' song, when their heart is in their study. Stating the facts above, I hope that somebody will take up the question. I should be much mistaken if all conscious beings gifted with a voice could not express their emotions that way.

J. CHRISTIAN BAY.

Ames, Iowa, Dec. 11, 1893.

BOOK-REVIEWS.

The Ore Deposits of the United States. By JAMES F. KEMP, A.B., E.M., Professor of Geology in the School of Mines, Columbia College. New York, The Scientific Publishing Company. 1893, 256 p., ill., $4.

PROBABLY no branch of geology is possessed of so scant a literature as is that treating of its economical relations, and yet certainly no branch of this science is more deserving of notice from its highly practical bearing upon the development of a country's resources. Prof. J. D. Whitney's "Metallic Wealth of the United States" (1854) was eagerly welcomed, but while this work has become classic it has become, also, of mere historical value. New mines have been opened in regions then unknown, new resources have been discovered and new methods of metal winning introduced, while, on the other hand, deposits then of greatest value have been worked out and deserted, and this not alone in the case of individual mines but over vast fields embracing wide areas of country. It is then in the scattered literature and in the works of foreign authors that American students of to-day have been compelled to seek a knowledge of American ore deposits. Moreover, the class most in need of this information, and for whom it would have the greatest value, is precisely that class to whom, from location and other causes, this scattered and foreign literature is least available. Nor are the foreign authors exact in their descriptions of American localities; authoritative writing can only come with extended study and the personal acquaintance gained by residence. For purposes of study and reference a correlation of our literature is necessary, and this can, necessarily, be accomplished only by one thoroughly acquainted with the ore deposits themselves.

The present work by Prof. J. F. Kemp has been received with greatest applause by all interested in mining and in economic geology. Concise in itself, it supplies an exhaustive reference to original papers, and places at once in the hands of the student or engineer a key to more extended research. As stated by the author in his preface, the purpose of the book is two-fold; first, it is intended to supply a condensed account of the metalliferous resources of the country which will be readable and serviceable as a text book and work of reference; and, second, it is hoped that the work will stimulate a study of the phenomena described. In carrying out this purpose the best work of recent investigators on the origin and changes of rocks, by microscopic study, and by the artificial production of ore and gangue material, has been constantly kept in mind. An acquaintance with geology and mineralogy is presupposed, only the more general geological facts and principles being given in Chapter I., together with the geological scale and the geographical distribution of the principal geological groups. Chapter II. discusses the formation of cavities in rocks, embracing those produced by local contraction and those formed by the more extensive movements in the earth's crust. Chapters III. and IV. treat of the minerals important as ores and on the filling of mineral veins. Lateral secretion, ascension by infiltration, replacement and other theories are here ably discussed, the author rejecting the contemporaneous formation, decension and sublimation of von Cotta's summary in the *Erzlagerstatten*. The theory of electrical activity, once so popular, is given in brief at the end of Chapter V. This chapter describes in some detail the structural features of mineral veins, the changes in character of vein filling and the secondary alteration of the minerals in veins. Chapter VI., the last of Part I., discusses exhaustively the classification of ore deposits. While a systematic arrangement, such as is possible in mineralogy, would fail in the grouping of ore deposits owing to the diversity of material and lack of definite demarkations, still this subject is of vast importance, and a classification is absolutely necessary to intelligent discussion and description. The author has given in summary the various classifications which have been proposed, grouping them under the following several heads: *a.* schemes involving the classification of veins only; *b.* schemes based upon form; *c.* schemes based partly upon form, partly upon origin;